

**SAF-F03-025**  
**200-LW-1/LW-2 Characterization – Soil**  
**FINAL DATA PACKAGE**

**FAX RESULTS TO:**

Chris Cearlock

N/A

INITIAL/DATE

Mark Benecke

N/A

INITIAL/DATE

**VERIFICATION OF CLIENT RECEIPT:**

Phone or CC:Mail to Chris Cearlock

01/30/04 PJE

INITIAL/DATE

Phone or CC:Mail to Mark Benecke

01/30/04 PJE

INITIAL/DATE

**MAIL COMPLETE COPY OF DATA PACKAGE TO:**

Chris Cearlock

E6-35

SCANNED COPY SENT 01/30/04 PJE

INITIAL/DATE

Mark Benecke

E6-35

SCANNED COPY SENT 01/30/04 PJE

INITIAL/DATE

**COMMENTS: (PLEASE INCLUDE THE FOLLOWING ON THE FAX COVER SHEET)**

SDG H2461

SAF-F03-025

☐ Rad only    ☐ Chem only    ☒ Rad & Chem

☒ Complete

☐ Partial

# DATA PACKAGE TRAVELER SHEET

SDG # H2461	RHA BOX #	SAF # F03-025
SDR #(s)		SAF TITLE 200-LW-1/LW-2 Characterization - Soil

START/END DATE	DP PROCESS ACTION	COMMENTS
1/22/2004 / 2/2/2004	DATA SCANNED	Rad - 01/23/04; Chem - 01/26/04; 02/02/04 (Physical Properties);
	DATA SENT TO AR	
12/15/2003 / 1/30/2004	DELIVERY GROUP	
12/15/2003 / 1/30/2004	FINAL DATA - CHEMICAL	Chem - 01/23/04 (Data for B17RW1, B17RT0, and B17RV8 from H2470 were also included in this package); 01/30/04 (Physical Properties data);
12/15/2003 / 1/22/2004	FINAL DATA - RADIOCHEMISTRY	Rad - 01/22/04;
1/22/2004 / 2/2/2004	LOGIN	Rad - 01/22/04; Chem - 01/23/04; 02/02/04 (Physical Properties);
1/22/2004 / 1/30/2004	ON HOLD (INCOMPLETE)	Still need Chemical and Physical Properties - Received Chemical 01/23/04; Received Physical Properties - 01/30/04;
1/22/2004 /	EDD VERIFICATION	
1/30/2004 /	TECH. VER.	
1/26/2004 / 1/26/2004	ADMIN. VER.	NO DEFICIENCIES



Geotechnical Laboratory  
PO Box 4339  
1570 Bear Creek Road  
Oak Ridge TN 37830  
865/482-6497

## CERTIFICATE OF ANALYSIS

Stephen Trent  
Fluor Hanford, Inc.  
825 Jadwin Avenue  
Richland, Washington 99352

January 29, 2004

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	<b>Eberline - Hanford</b>
Shaw Project Number:	<b>100846.03000000</b>
Client Sampling Authorization Form No.	F03-025
Client Sample Data Group:	H2461
Date Received by Lab:	December 16, 2003
Number of Samples:	One (1)
Sample Type:	Soil



### I. Introduction/Case Narrative

One soil sample was received by the Shaw Geotechnical Laboratory on December 16, 2003. The sample was submitted for determination of particle-size distribution and moisture content. The sample number received was B17RX3.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole  
Laboratory Manager, Geotechnical Services

## **II. Analytical Results/Methodology**

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2003. Shaw Environmental and infrastructure, Standard Operating Procedures.

Particle-Size Distribution of Soils .....	<b>ASTM D 422</b>
Moisture Content of Soil and Rock.....	<b>ASTM D 2216</b>
Bulk Density.....	<b>ASTM D 2937</b>
	<b>USCAE 1110-2-0906</b>

## **III. Quality Control**

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.
- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

#### IV. Data Qualification

Two moisture content results are reported. One data page reports the moisture content of a sample aliquot submitted for "moisture content" determination. The second moisture result is reported on the grainsize report sheet, and was determined using excess material from the grainsize test specimen.

The bulk density test method requested was ASTM D 2937, Density of Soil In-Place by the Drive-Cylinder Method. This method covers field procedures used to procure undisturbed, near-surface soil samples, as well as analysis for bulk density. The data results presented here were derived from laboratory tests performed on client-supplied core (tube) samples. Shaw Environmental was not involved in sampling activities.

**Appendix A**  
**Sample Cross-Reference List**

Page 4 of 14  
January 29, 2004  
Stephen Trent  
Fluor Hanford, Inc.  
Shaw Project Name: Eberline Hanford  
Shaw Project No. 100846.03000000  
SAF No. F03-025  
SDG No. H2461

**Shaw Geotechnical  
Laboratory  
Oak Ridge TN  
865/482-6497**

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### SAMPLE NUMBER CROSS-REFERENCE LIST

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LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
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BC0258 .....	B183P5.....	Soil
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**Appendix B**  
**Sample Test Results**



## MOISTURE CONTENT

PROJECT NAME

**Eberline - Hanford**

PROJECT NUMBER

**100846.03000000**

IT LAB SAMPLE NO.	CLIENT SAMPLE NO.	MOISTURE, % ASTM D 2216	MOISTURE, % SW846	SOLIDS, % SW846
BC0252	B17RX3	2.6	2.6	97.4

ASTM D 2216 results are based on dry sample weight.

SW846 results are based on wet sample weight.

Solids content is determined by subtracting the SW846 moisture (%) from 100.

Dry density is the weight of the dry sample solids divided by the volume of the original sample.

**PARTICLE-SIZE ANALYSIS  
 ASTM D 422**

Project Name Eberline - Hanford

Client Sample No. B17RX3

Project No. 100846.03000000

Lab Sample No. BC0252

Specific Gravity = 2.65  
 assumed for calculations

Moisture Content = 2.6%  
 based on dry sample weight

**SIEVE ANALYSIS**

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	100.0%
	#4	4.750	100.0%
	#10	2.000	100.0%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	99.3%
	#40	0.425	94.3%
	#60	0.250	80.5%
	#100	0.149	58.1%
	#140	0.106	45.4%
	#200	0.075	36.6%

**HYDROMETER ANALYSIS**

H Y D R O M E T E R	Diameter mm	Percent Finer
	0.06393	24.0%
	0.04787	17.0%
	0.03496	13.1%
	0.02262	9.6%
	0.01326	7.4%
	0.00947	6.1%
	0.00679	3.9%
	0.00478	3.1%
	0.00332	2.2%
	0.00139	1.7%

0.0% Gravel

63.4% Sand

36.6% Silt/Clay

BOULDERS	COBBLES	GRAVEL				
		COARSE	FINE	COARSE	MEDIUM	FINE

Silt/Clay

**Appendix C**  
**Chain-of-Custody and Request-for-Analysis Records**

SDG# H2461

100846.0300000

FLUOR Hanford Inc.		CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-025-015		Page 1 of 1		
Collector <i>POPE / PRISTER / HUGHES</i>	Company Contact TRENT, STEVE	Telephone No. 373-5689		Project Coordinator TRENT, SJ		Price Code 8N		Data Turnaround 45 Days		
Project Designation 200-LW-1/LW-2 Characterization - Soil		Sampling Location 216-B-58 (147.5-150.8) <i>AT 11/24/03</i> <i>(97.5-100)</i>		SAF No. F03-025		Air Quality <input type="checkbox"/>				
Ice Chest No. <i>ERC 99001</i>		Field Logbook No. <i>KNF 3561</i>		COA 119143ES10		Method of Shipment FEDERAL EXPRESS				
Shipped To Shaw Group		Offsite Property No. <i>A040083</i>		Bill of Lading/Air Bill No. <i>SEB 08PC</i>						
POSSIBLE SAMPLE HAZARDS/REMARKS										
Special Handling and/or Storage  <i>SDG# H2461</i>				Preservation	None	None				
				Type of Container	Moisture Resistant	Liner				
				No. of Container(s)	1	1				
				Volume	200mL	1000mL				
SAMPLE ANALYSIS				Moisture Content - D2216	Particle Size (Dry Sieve) - D422; Bulk Density - D2937					
Sample No.	Matrix *	Sample Date	Sample Time							
B17RX3	SOIL	12-10-03	1245	X	X					
						BC 0252			TIE TO B17 RW6	
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *		
Relinquished By/Removed From <i>Marken/Marken</i>		Date/Time 12-10-03 1515		Received By/Stored In <i>FRIDGE #1</i>		Date/Time 12-10-03 1515		<i>SDG# H2461</i>  Personnel not available to Relinquish samples from 3728 Ref # <i>3B</i> on 12/12/03		
Relinquished By/Removed From <i>Hidge #1</i>		Date/Time 12-11-03 1000		Received By/Stored In <i>Marken/Marken</i>		Date/Time 12-11-03 1000				
Relinquished By/Removed From <i>Marken/Marken</i>		Date/Time 12-11-03 1016		Received By/Stored In <i>Ref # 3B</i>		Date/Time 12-11-03 1016				
Relinquished By/Removed From <i>REF 3B 3728</i>		Date/Time 12-12-03 1100		Received By/Stored In <i>SJOAR</i>		Date/Time 12-12-03 1100				
Relinquished By/Removed From <i>SIGAL</i>		Date/Time 12-12-03 1100		Received By/Stored In <i>FED EX</i>		Date/Time				
Relinquished By/Removed From <i>FED EX</i>		Date/Time		Received By/Stored In <i>FED EX</i>		Date/Time				
LABORATORY SECTION		Received By <i>Relinquished by Fluor</i>		Date/Time 12/15/03		Title <i>FED EX</i>		Received 12/16/03 @ SHAW E + J ETDC by <i>D. Hushy</i> - SR. LAB. TECH.		
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time 12/16/03				



PAGE 1

Eberline Svcs

CHAIN OF CUSTODY

ORD # R3-12-100

12/15/03 09:39:03

WORK ID: SAF# F03-025 SDG H2461

RCVD: 12/15/03 DUE: 01/29/04

KEEP: 01/28/05 DISP: S

DASH SAMPLE IDENTIFICATION

STORED

TESTS

01A-S B17RX3

SHAW

DISPOS E331S E333S

RELEASED BY

DATE

TRANSFERRED TO

DATE

RECEIVED BY

DATE

<u>Jan Jones</u>	<u>12/15/03</u>	<u>SHAW LAB</u>	<u>12/15/03</u>	<u>Don Henley SHAW</u>	<u>12/16/03</u>

Received (1) tube @ 7 lbs. approx.  
and (1) container @ 200g. approx.  
on 12/16/03 via Fed Ex  
both samples marked B17RX3 - D. Henley

BC 0252

SHAW EX/ETDC  
Geotech. Lab. 12/16/03

PDG# H2461

PAGE 1 Eberline Srvces  
CONTRACT: PO# RSH-SOW-93-0003

PURCHASE ORDER # R3-12-100-SU-SW  
12/15/03 09:38:49

ORDER Eberline Services/Richmond  
FROM Analytical Services  
2030 Wright Avenue  
Richmond, CA 94804-0040  
ATTEN Purchasing  
PHONE 510-235-2633

INVOICE Eberline Services/Richmond  
TO Analytical Services  
2030 Wright Avenue  
Richmond, CA 94804-0040  
ATTEN Purchasing  
PHONE 510-235-2633

*Aug*  
\_\_\_\_\_  
AUTHORIZED BY

ORDER Shaw Geotechnical Laboratory  
TO 1570 Bear Creek Road  
Oak Ridge, TN 37830

Please telephone our Sample Control Department immediately if  
any problems are encountered in the receipt or the analysis of  
the samples listed below.

ATTEN Ralph R. Cole

This Purchase Order authorizes Shaw to perform all work  
listed on the enclosed COC. Alterations to work requested can  
only be made by Eberline Services or the appropriate Hanford  
client.

PRICE CODE: 8N

<u>FRACTION</u>	<u>TEST</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>DUE DATE</u>	<u>COST</u>
01A	E331S	D422 Particle Size-Dry Svc	Please Advise	03/24/50	0.00
	E333S	D2216 Moisture Content	Please Advise	09/12/50	0.00
TOTAL CHARGE NOT TO EXCEED					<u>\$0.00</u>

**PAGE 1**

**Eberline Srvces**

## WORK SHEET

**ORD # R3-12-100**

CLIENT: WES\_HANFORD      CON: KCJ

**CAT: ENVMSW**

RCVD: 12/15/03 DUE: 01/29/04

PROJ: WHC\_FLR

**12/15/03 09:38:56**

STAT: TRANSMITTED 12/15/03

DASH	SAMPLE IDENTIFICATION	STORED	DEPT	START	DUE BY	TESTS	FRACTIONS /
01A-S	B17RX3	SHAW	EN	12/15	12/15	DISPOS	
			SU	12/20	01/29	E331S	E333S

# WSCF

## ANALYTICAL RESULTS REPORT

Attention: Steve Trent  
Project: F03-025: F03-025

Group #: WSCF20031640

			WSCF										
Sample #	Client ID		CAS #	Test Performed	Matrix	Method	RQ	Result	Unit	DF	MDL	Analyze	Sample Receive
W030001139	B17RW6	TRENT	12587-46-1	Gross alpha	SOIL	LA-508-421		2.20	pCi/g	1.00	1.8	12/11/03	12/10/03
W030001139	B17RW6	TRENT	E.T.C	Alpha error by LC	SOIL	LA-508-421	+	4.4	pCi/g	1.00	0.0	12/11/03	12/10/03
W030001139	B17RW6	TRENT	12587-47-2	Gross beta	SOIL	LA-508-421		9.00	pCi/g	1.00	2.7	12/11/03	12/10/03
W030001139	B17RW6	TRENT	E.T.C	Beta error by LC	SOIL	LA-508-421	+	7.2	pCi/g	1.00	0.0	12/11/03	12/10/03

MDL= Minimum Detection Limit

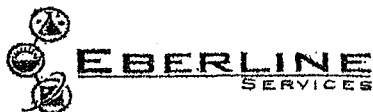
RQ= Result Qualifier

DF= Dilution Factor

\* - Indicates results that have NOT been validated; + - Indicates more than six qualifier symbols

Report WGPP/ver. 1

Ground Water Protection Program



**RICHMOND, CA LABORATORY**  
**SAMPLE RECEIPT CHECKLIST**

*Saturday Delivery 12/13/03*

Client: Fluor Hanford Date/Time received 12/15/03 7:15 AM  
CoC No. F03-025-015  
Container I.D. No. ERC99001 Requested TAT (Days) 45 P.O. Received Yes [ ] No [ ]

**INSPECTION**

1. Custody seals on shipping container intact? Yes [ ☒ ] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [ ☒ ] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [ ☒ ] No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [ ☒ ] No [ ] N/A [ ]
5. Packing material is: Wet [ ] Dry [ ☒ ]
6. Number of samples in shipping container: 1
7. Number of containers per sample: 2 (Or see CoC \_\_\_\_\_)
8. Samples are in correct container Yes [ ☒ ] No [ ]
9. Paperwork agrees with samples? Yes [ ☒ ] No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [ ☒ ]
11. Samples are: In good condition [ ☒ ] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [ ] pH \_\_\_\_\_ Preservative \_\_\_\_\_
13. Describe any anomalies: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date \_\_\_\_\_
15. Received by [Signature] Date: 12/15/03 Time: 7:15 AM

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Ion Chamber Ser. No. \_\_\_\_\_

Calibration date \_\_\_\_\_

Alpha Meter Ser. No. \_\_\_\_\_

Calibration date \_\_\_\_\_

Beta/Gamma Meter Ser. No. \_\_\_\_\_

Calibration date \_\_\_\_\_

From: Fred Sarao (510)235-2633  
EBERLINE SERVICES  
2030 WRIGHT AVE  
RICHMOND, CA, 94804

REVENUE BARCODE



FedEx.

To: Sample Control (865)482-6497  
Shaw Geotechnical Lab  
1570 Bear Creek Road  
Oak Ridge, TN, 37830

SHIP DATE: 15DEC03  
WEIGHT: 16 LBS  
DIMMED: 24 X 14 X 16

Ref: 3265-003-00 RD



DELIVERY ADDRESS BARCODE (FEDEx-EDR)

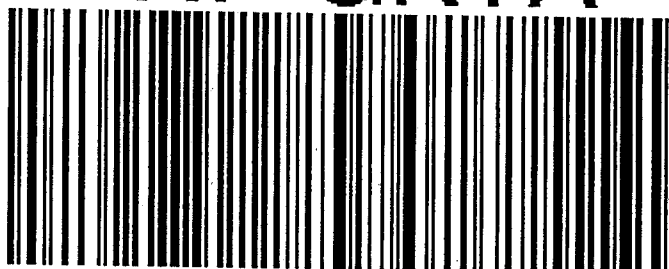
TRK # 7910 9233 7607 698M

FedEx STANDARD OVERNIGHT

TYS

37830-TN-US

NP GKTA

TUE  
A2Deliver by:  
16DEC03

## Shipping Label: Your shipment is complete

[Cancel shipment](#) [Edit shipment information](#) [Process another shipment](#) [Repeat last shipment](#)

1. Use the 'Print' feature from your browser to send this page to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

**Warning:** Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.

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